Inflatable Antennas for CubeSats Communication and Science in Deep Space

Completed Technology Project (2015 - 2016)

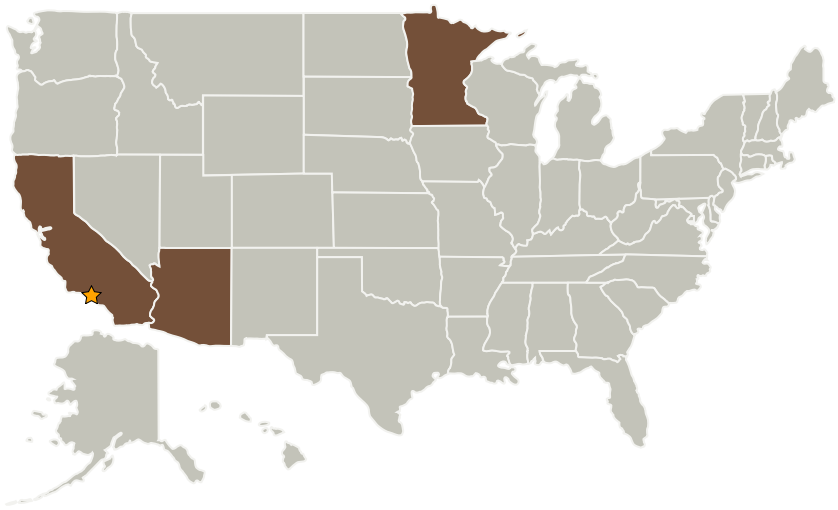
Project Introduction

The work will be organized as a collaboration between JPL and two external partners: Arizona State University and Meteorological Product Inc. (Mylar manufacturer). Objectives: EM Analysis and feed antenna re-design (JPL): Design of an array feed to compensate for surface curvature, fabrication and test together with the inflatable membrane in the anechoic chamber. Pressure control for the MESA test (JPL): Use of a pressure control system to ensure correct inflation and maintenance of the desired shape during the MESA test. Mechanical Analysis (JPL): Development of a canister and of a mechanism for storage and deployment. Inflation system reliability (ASU): Development of a mechanism to control the release of the powder at the beginning of the inflation, and development of a UV curing rigidization system with experimental tests. Antenna prototyping (MPI): Prototype fabrication. Control analysis (JPL): Test at the SSDT for attitude dynamics, including antenna pointing and disturbances' characterization.

Anticipated Benefits

Potential Applications: CubeSats (from 2U up, LEO and interplanetary). Small satellites. Traditional spacecraft (as an emergency antenna). Follow-On options: High altitude balloon deployment experiment (as part of the capstone class at ASU). Proposed: NASA CAN STMD proposal with ASU to build and launch a 3U CubeSat demo carrying the inflatable antenna. Additional options: SBIR, STTR and/or SURP: Direct development funding from a CubeSat mission.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Innovation Fund: JPL CIF

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Arizona State University-Tempe(ASU)	Supporting Organization	Academia	Tempe, Arizona
Meteorological Product, Inc.	Supporting Organization	Industry	

Primary U.S. Work Locations	
Arizona	California
Minnesota	

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Project Management

Program Director:

Michael R Lapointe

Program Manager:

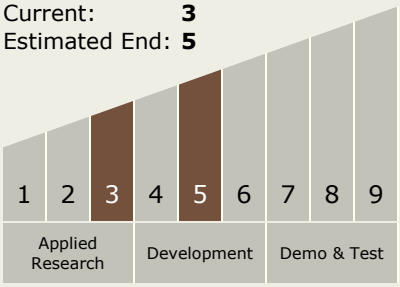
Fred Y Hadaegh

Principal Investigator:

Alessandra Babuscia

Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **5**



Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency
    - TX05.2.6 Innovative Antennas